REMARKS

Receipt of the Office Action of April 18, 2005 is gratefully acknowledged.

Claims 12-18, 20-37 and 39-67 are pending. Claims 44, 45, 49 and 50 are allowed and claims 12-18, 20-37, 39-43, 46-47 and 51-67 are rejected. The examiner's indication as to the allowance of claims 44, 45, 49 and 50 is sincerely appreciated

The rejections are as follows: claims 20, 22-26, 28, 30-34 and 55-58 under 35 U.S.C. 102(b) as anticipated by Drahm '126; claims 12, 14-18, 27, 35, 59 and 61-67 as unpatentable under 35 U.S.C. 103(a) over Drahm '126 in view of Drahm EP 849 568 (Drahm '568); claims 21 and 29 as unpatentable under 35 U.S.C. 103(a) over Drahm '126 in view of Van Cleve and claims 13, 36, 37, 39-43, 46-48, 51-54 and 60 as unpatentable under 35 U.S.C. 103(a) over Drahm '126 in view of Drahm '568 and Van Cleve.

These rejections have been carefully considered and are respectfully traversed.

In all the noted rejections, the basic reference is the Drahm '126 patent. It is respectfully submitted that this patent does not and cannot anticipate the invention defined in the pending rejected claims.

Drahm '126 relates to the measure of viscosity. Note in particular col. 8, lines 52 ff. in connection with Fig. 8 of Drahm '126:

"...The signal from one of the sensing elements 18, 18' or 19, 19' and a signal provided by the driver circuit and representative of the vibration amplitude of the dummy tube 14, 14', e.g., the above-mentioned signal from the electromagnetic system 30, are peak-value-rectified by means of diodes 51 and 52 with associated capacitors 53 and 54, respectively. The output signal of the diode 51 is divided by the output signal of the diode 52 by means of an analog divider 55. The output signal of the divider 55 is converted to the viscosity signal

V by means of a microcontroller 56. To this end, the microcontroller 56 may contain a look-up table which contains a previously stored assignment between the output-signal values of the divider 55 and the viscosity V".

In view of this passage from Drahm '126, it should be clear that Drahm '126 ***does not teach*** an evaluation circuit which derives the viscosity from the excitation current and from the sensor signal as claimed in claims 20 and 28, because the flow meter in Drahm '126 doesn't generate a signal representing the excitation current. Moreover, Drahm '126 uses only rectified voltages from the sensor coil and from the exciter coil. And this DC voltage of the exciter coil clearly does not correspond with the excitation current, because its magnitude is not only determined by the AC excitation current, i, but also by at least one of changes in temperature and corresponding changes in resistance of the coil wire, changes in oscillation frequency and/or amplitude of the mid point region of a dummy tube, changes in the amplitude of the DC current, I, which is superimposed on AC current, i, due to changes in density of the fluid etc.

Clearly, this voltage does not result from the excitation current as stated by the Examiner. Therefore, the DC voltage cannot be seen as representative of the AC current, i, exciting the dummy tube oscillations.

In fact, Drahm '126 teaches only viscosity determination based on the velocity of the lateral flow tube deflections related to a velocity of the dummy tube deflections (see also claim 8, col. 10, lines 62 ff.), while the present invention teaches at this point that the viscosity determination is based on the velocity of lateral flow tube deflections and on an excitation force causing the flow tube deflections (cf. eq. (2), col. 7, line 9 in Drahm '126). Moreover, the microcontroller 56 is clearly not an evaluation circuit which derives a viscosity value from a sensor signal and from the excitation current as claimed in claims 20 and 28. The microcontroller 56 derives only a value stored in a lock-up table from a quotient of two DC voltages,wherein each of these DC voltages represents

only an amplitude of tube oscillations. But DC voltages clearly does not represent the AC excitation current. At the most Drahm '126 teaches only an evaluation circuit which takes the quotient of signal corresponding with a local magnitude of the flow tube vibration, i.e. inlet-side vibration, and a signal corresponding with amplitude (= magnitude of midpoint oscillation) of dummy tube vibration (see col. 7, lines 42 - 45).

Due to the fact that the DC voltage of the exciter coils represents a magnitude of a mixture of a plurality of various voltages, wherein a portion related to the DC voltage drop due to current, I, within the coil wire (ca. 50%) and a portion related to an voltage change due to changes in fluid density as disclosed in col. 7, lines 23 ff. in connection with col. 2, lines 11 ff. (changes in resonance frequency = changes in DC current I; for example $\Delta I/\Delta fres >> 100$ mA / 10 Hz) may actually be the dominant portions, the viscosity value disclosed by Drahm '126 represents rather a viscosity-density product or a density rather than an actual viscosity.

In view of the above mentioned limitations, claims 20, 22 - 26, 28, 30 - 34 and 55 - 58 cannot, it is respectfully submitted, be anticipated by Drahm '126.

As to the rejection of claims 12, 14 - 18, 27, 35, 59 and 61 - 67: a careful reading of Drahm '126 and Drahm '568 (U.S. Patent 6,006,609) should make it clear that neither Drahm '126 nor Drahm '568 teach any combination of the lateral mode dummy tube visco-meter, as disclosed in Drahm '126, with the torsion mode visco-meter, as disclosed in Drahm '568. The two meters are different

In fact, it is respectfully submitted that Drahm '126 teaches away from any combination of the lateral mode dummy tube visco-meter with the torsion mode visco-meter, when one considers the statement in Drahm '126 found at col. 1, line 56 - col. 2, line 47 regarding details of the disadvantages in connection with torsion mode flow meters and with straight tube flow meters (DE-A 41 43 361 = U.S. 5,365,794, U.S. 5,476,013), respectively. These two types of flow meters

define the flow meter of Drahm '568.

Then, from col. 5, lines 50 ff. in connection with col. 6, lines 62 ff. one can see that the essential features of the Drahm '126 flow meter consist in an indirect excitation of the flow tube via a dummy tube and in a superposition of a DC current to the a vibration exciting AC current. Starting from this, a combination of Drahm '126 and Drahm '568 would lead to a flow meter whose torsion mode is excited indirectly via anti-vibrator 14' (see also Drahm '126, Fig. 2a, b in connection with Drahm '568 (Fig. 14) and with a mixed (DC & AC) current, if any.

Any combination of Drahm '126 and Drahm '568 clearly does not lead to visco-meter with an excitation system acting on the flow tube to drive a bending mode vibration as claimed in claim 12. Moreover, Drahm '126 does not disclose an evaluation circuit which derives the viscosity from the excitation current and from the sensor signal as claimed in the rejected claims.

Moreover, reading Drahm '568 at col. 4, lines 40 - 55, one will recognize that, in contrast to the examiner's statement at page 7 (ad 8.), any combination of Drahm '126 (= only torsional mode for viscosity measurement) with Drahm '568 (= only lateral bending mode for viscosity measurement) must clearly be base on improper hindsight reasoning, because Drahm '568 clearly teach away from the use of lateral bending mode for viscosity measurement.

As to the rejection of claims 36, 37, 39 - 43, 46 - 48 and 51 - 54: reading Van Cleve at col. 8, lines 48 - 59, as indicated by the examiner, and further lines 51 ff., it will be seen that this viscosity measurement system is based on the determination of the pressure drop over the flow tube, but not on the determination of the excitation current and/or the damping related to friction forces. Because Van Cleve does already disclose a complete measuring system which derives from two Coriolis flow meters a density value and a viscosity value there is no need to combine this measuring system with the measuring system as disclosed by Drahm '126. Further, Drahm '126 doesn't disclose an excitation

arrangement acting on a flow tube approximately midway between its inlet end and its outlet end as claimed in claim 36. Drahm '568 does not disclose the use of the sensor signal for determining both, density and viscosity of the fluid. Therefore, any combination of these three patents to get a measuring system according to the amended claim 36 would have to be based only of a typical ex-post-facto analysis in view of the present invention.

As to the rejection of claims 13 and 60: not one of the three prior art documents combined by the Examiner discloses, it is respectfully submitted, the measurement of the viscosity based on the excitation current and a measured density of the fluid. Van Cleve merely discloses the use of the density to determine the mass flow rate from the volume flow rate. Indeed, the flow rate measurement isn't based on the excitation current, but on the measurement of pressure differences (see eq. 16 - 18 in connection with eq. 21- 26). Moreover, there exists no hint to use the excitation current of the flow meter for determining the viscosity of the fluid.

It is clear from the above discussion that the rejected claims recite sufficient differences to warrant their allowance as well as the allowance of claims 44, 45, 49 and 50.

In view of the foregoing, reconsideration and re-examination are respectfully requested and claims 12-18, 20-37, 39-43, 46-48 and 51-67 also found allowable.

Respectfully submitted,

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